

P21469.A03

1. Field of the Invention

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b The invention relates to a method for the operation of a machine for the manufacture and/or refinement of material webs, in particular paper webs. The invention also relates to a measurement system for the carrying out of such a method.

2. Discussion of Background Information

Such machines, for example paper making machines, consist of a plurality of different machine sections of which at least some are in turn subdivided into further part sections. Each machine section or part section influences the quality of the finished product, for example of a paper web. It is possible to influence the manufacturing process by appropriate control and regulation of individual machine components forming the respective machine section or part section. The large number of possibilities of adjustment makes it difficult to determine the influence of changes which are made at individual machine components on the ability of the respective machine section or part section to function or on the quality of the finished product.--

Please replace the second full paragraph on page 2 and the paragraph bridging pages 2 and 3 of the specification with the following (see Appendix 2 for changes):

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b --SUMMARY OF THE INVENTION

The invention therefore provides a method and also a measuring system of the initially

P21469.A03

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named kind with which a picture can be obtained of the manufacturing process as accurately as possible, in particular in a paper making machine, and which in particular enables changes to be made in the manufacturing process for its optimization or change in targeted manner.

The invention provides that process data concerning at least one measured parameter which relates to a manufacturing process is detected and jointly evaluated in the region of at least one machine section, in particular of the dryer section of a paper making machine, with the detection of the process data taking place at a plurality of measurement zones which are arranged in series in the process direction.--

Please replace the third full paragraph on page 10 of the specification with the following (see Appendix 3 for changes):

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--The invention also provides for a measurement system for carrying out the method of the invention which has at least one measurement device for the detection of process data relating to at least one measured parameter at at least one measurement point and also an evaluation unit for the joint evaluation of the process data.--

Please insert the following text after the first full paragraph on page 11 of the specification:

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--The invention also provides for a method of operating a machine for manufacturing

P21469.A03

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and/or refining a material web wherein the machine includes at least one machine section, the method comprising arranging a plurality of measurement zones in series along a process direction, and detecting data in a region of the at least one machine section via at least one measurement zone of the plurality of measurement zones, wherein the data concerns at least one measured parameter relating to the manufacture or refinement of the material web.

The material web may be a paper web. The at least one machine section may be a drying section. The detecting may comprise detecting data at each of the plurality of measurement zones. The detecting may comprise detecting data at at least two measurement zones of the plurality of measurement zones. The detecting may comprise substantially simultaneously detecting data at the at least two measurement zones. The at least one machine section may comprise a plurality of part sections. The detecting may comprise detecting data in a region of at least one part section of the plurality of part sections. The method may further comprise changing a machine setting of at least one machine component of the at least one machine section. The method may further comprise controlling or regulating a machine setting of at least one machine component of the at least one machine section.

The data may relate to at least one of the at least one machine section, the material web and to an environment of the material web or the at least one machine section. The data may relate to the material web and comprise at least one of a moisture of the material web,

P21469.A03

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a temperature of the material web, a thickness of the material web, and a weight per unit area of the material web. The data may relate to the at least one machine section and comprises at least one of a characteristic value of a surface of the at least one machine section. The surface may comprise a roll or cylinder surface and wherein the characteristic value comprises a temperature. The at least one machine section may comprise at least one of a steam system and a condensate system and wherein the data relates to a characteristic value of the steam system or condensate system. The at least one machine section may comprise a screen and wherein the data relates to a characteristic value of the screen. The characteristic value may comprise at least one of a temperature, a moisture content, and a permeability of the screen.

The data may relate to at least one a characteristic value of an environment of the at least one machine section. The characteristic value of the environment may comprise at least one of an air temperature, an air moisture content, an airflow speed, and an airflow direction. The detecting may comprise detecting data at at least two measurement zones of the plurality of measurement zones, the detecting of the at least two measurement zones occurring substantially uninterruptedly. The detecting may comprise detecting data at at least two measurement zones of the plurality of measurement zones, the detecting of the at least two measurement zones occurring at regular time intervals.

The method may further comprise supplying the data to an evaluation unit. The

P21469.A03

4
B method may further comprise monitoring and/or influencing the manufacture or refinement of the material web using the evaluation unit. The method may further comprise continuously controlling and/or regulating the manufacture or refinement of the material web using the evaluation unit. The at least one machine section may comprise a plurality of machine components, the method further comprising independent controlling and/or regulating each of the plurality of machine components.

The method may further comprise evaluating the data to effect changes in the manufacture or refinement of the material web. The evaluating may comprise determining at least one of a localized disturbance and a faulty machine component of the at least one machine section. The evaluating may comprise creating a model which describes the manufacture or refinement of the material web. The method may further comprise storing the data regarding the manufacture or refinement of the material web. The method may further comprise transmitting the data regarding the manufacture or refinement of the material web to another location. The transmitting may comprise transmitting the data via the Internet. The method may further comprise evaluating the data at the other location to effect changes in the manufacture or refinement of the material web.

The detecting may comprise detecting data using reflection measurement. The method may further comprise at least one of supporting the material web and guiding the material web, wherein the detecting comprises detecting the data in a region of the material

P21469.A03

B4

web. The method may further comprise at least one of supporting the material web and guiding the material web on at least one of a screen, a cylinder and a roll, wherein the detecting comprises detecting the data in a region of the screen, the cylinder or the roll. The method may further comprise regulating or checking at least one of a longitudinal profile and a course of the material web. The at least one machine section may comprise a dryer section, the method may further comprise regulating or checking at least one of a heating curve of the dryer section. The at least one machine section may comprise a dryer section, and the method may further comprise continuously regulating or checking at least one of a heating curve of the dryer section. The at least one machine section may comprise a dryer section, and the method may further comprise regulating at least one component of the dryer section, wherein the at least one component comprises at least one of an individual dryer group, a dryer, and a humidifier.

The method may further comprise regulating a transverse moisture profile of the material web. The regulating may comprise step-wise regulating the transverse moisture profile of the material web. The data may relate to a measured humidity content and the regulating may comprise step-wise regulating the transverse moisture profile of the material web based upon the measured humidity content. The at least one machine section may comprise a plurality of zone-wise regulatable dryers, and the method may further comprise regulating a transverse moisture profile of the material web. The at least one machine section

P21469.A03

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may comprise a press section having at least one steam blow box, and the method may further comprise regulating a transverse moisture profile of the material web. The method may further comprise regulating a longitudinal moisture profile of the material web. The data may relate to a measured humidity content and wherein the regulating may comprise regulating the longitudinal moisture profile of the material web based upon the measured humidity content.

The invention also provides a measurement system for use in operating a machine for manufacturing and/or refining a material web wherein the machine includes at least one machine section, the system comprising a plurality of measurement zones arranged in series along a process direction of the machine, at least one measurement device for detecting data in a region of the at least one machine section, the at least one device being located in at least one of the plurality of measurement zones, and an evaluation unit for evaluating the data.

The invention further provides a measurement system for use in operating a machine for manufacturing and/or refining a material web wherein the machine includes at least one machine section, the system comprising a plurality of measurement zones arranged in series along a process direction of the machine, at least one of the plurality of measurement zones being located in the at least one machine section, at least one measurement device for detecting data being located in at least one of the plurality of measurement zones, and an evaluation unit for evaluating the data.

P21469.A03

B4
The data may concern at least one measured parameter that relates to the manufacture or refinement of the material web. The material web may be a paper web. The at least one machine section may be a drying section. Each of the plurality of measurement zones may include at least one measurement device. At least two measurement zones of the plurality of measurement zones may comprise at least one measurement device. The at least one measurement device may be at least one of rotatable and movable in at least two degrees of freedom. The at least one measurement device may be at least one of rotatably movable and linearly movable. The at least one measurement device may be movable and capable of detecting the data at a plurality of measurement locations. The at least one measurement device may be movable in a direction which is approximately perpendicular to the process direction.

The invention also provides for a measurement system for use in operating a machine for manufacturing and/or refining a material web wherein the machine includes a press section, a dryer section and a refinement section, the system comprising a plurality of measurement zones arranged in series along a process direction of the machine, each of the dryer section and the refinement section including at least two measurement zones, at least one measurement device for detecting data being located in a region of each measurement zone, and an evaluation unit for evaluating the data being coupled to each of the at least one measurement devices, wherein the data concerns at least one measured parameter relating to

P21469.A03

the manufacture or refinement of the material web.--

Please replace the second, third and fourth paragraphs on page 11 of the specification with the following (see Appendix 4 for changes):

--Further preferred embodiments of the invention are set forth in the claims, in the description and also in the drawing.

BRIEF DESCRIPTION OF THE DRAWINGS

The invention will be described in the following by way of example with reference to a drawing, the single figure of which schematically shows a measurement system used at a paper making machine to carry out the method of the invention in accordance with an embodiment of the invention.

DETAILED DESCRIPTION OF THE INVENTION

In the drawing a part of a paper making machine is shown in which a press section 20, a fryer section, a refinement section 22 and also a roller section 24 follow one another in the process direction P.--

Please replace the third full paragraph on page 13 of the specification with the following (see Appendix 5 for changes):

--The same also applies to the refining section 22 at which two measurement zones

P21469.A03

12 are provided in the illustrated embodiment, with the first measurement zone 12 in the process direction P being arranged beneath the refinement section 22 and the second measurement zone 12 being located within the rear one of the two part sections 14.--

Please add the following Abstract appended on the following page: